Intermittent ice formation on golf greens and fairways is a common event for the northern areas of Europe and the United States. However over the last few years ice formation has increasingly been singled out as the cause of, or strongly associated with, winter injury. Ice cover injury occurs either directly from continuous ice cover or as part of freeze injury - low temperature kill.

The loss of cold hardiness occurs under ice cover but varies among turfgrass species. Under continuous ice cover annual bluegrass loses its cold hardiness, while creeping bentgrass is not affected (3). The loss of cold hardiness in annual bluegrass is likely due to the anoxia - lack of oxygen - conditions that develop under an ice cover (3).

Although ice injury to creeping bentgrass is remote, and certainly not an issue in most of the world, I wonder about its role in winter injury to creeping bentgrass on golf courses in the Rocky Mountains or Scandinavia where ice cover may exceed 120 days. It is not uncommon to observe creeping bentgrass greens in these areas that have suffered winter injury believed to be caused by a combination of ice and freeze injury. It might be possible that prolonged anoxia conditions in areas where ice cover is excessive may reduce creeping bentgrass cold hardiness, making it more susceptible to freeze injury.

Beard (5) reported differences among creeping bentgrass cultivars to ice cover. He found that seeded creeping bentgrasses, especially 'Seaside', are less tolerant of ice coverage than the vegetative cultivars like 'Toronto'. In addition, the colonial bentgrasses were considerably less tolerant than the creeping bentgrasses. Although published over 39 years ago - and the creeping bentgrass cultivars used may not be relevant at this time - the idea that variability among cultivars to ice coverage exists may make it difficult in extreme situations of ice cover to say "creeping bentgrass is not affected by ice covers".

ICE IN ASSOCIATION WITH FREEZE INJURY

In most of the Midwest and Northeastern United States, a continuous ice cover exceeding 45 days is unlikely. The winter weather pattern is generally broken with intermittent periods of thawing that melts the ice. Where 'ice injury' plays a more likely role is as a component of freeze injury. In this role the freezing of water that would occur with a rapid drop of temperature in or around the growing point during or after dehardening of annual bluegrass.

The critical precursor to freeze injury is the loss of cold hardiness through dehardening and subsequent rehydration of the annual bluegrass crown region. Rehydration of the crown region initiates in late winter or early spring. Between creeping bentgrass and annual bluegrass, annual bluegrass has a relatively high crown hydration level. Thus making it more susceptible to freezing.

Although ice covers contribute to the decline in cold hardiness, the most important factor in dehardening is temperature (6). In the case of annual bluegrass the dehardening process can occur quickly when soil temperatures exceed 8degC (46degF) for 48 hours (7).
As we move out of winter into spring Dr Karl Danneberger helps you to assess the damage that ice can cause.

In conclusion, winter injury is normally a combination of several factors, one of which is ice cover. A continuous ice cover alone is not a common event for most northern golf courses. However, freeze/thaw cycles in late winter can create a situation where excessive water in and around annual bluegrass crowns can create freeze injury from the ice formed from the freezing of water.

References:
2. Beard, J.B. 1965. Effects of ice covers in the field on two perennial grasses. Crop Science 5: 139-140.

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